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PUBLICATION

MARCH 1973, No. 3

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL
MARINE
FISHERIES
SERVICE

SOUTHWEST
FISHERIES
CENTER
LA JOLLA,
CALIFORNIA

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER
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FISHING INFORMATION

MARCH 1973, No. 3

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) a narrative description of subsurface temperature structure for parts of the North Pacific, 4) charts of winds and pressures for the eastern North Pacific, 5) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 6) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. This is a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

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La Jolla, California

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L. Eber (Figure 4), F. Miller (Figures 7, 8, and 9)
J. Renner (Figures 1, 2, 3, 5, and 6), J.F.T. Saur (Figure 10)

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K. Raymond

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Expendable bathythermograph observations are made by the Mates of the S. S. Chevron Mississippi of Chevron Shipping Co., and processed with assistance from the NMFS Environmental Group, Monterey: Project partially supported by National Science Foundation Grant AG-256.

Sea Surface Temperature and Environmental Conditions

L. EBER AND F. MILLER

Eastern North Pacific

Spring warming was evident in some portions of the eastern north Pacific this month, particularly in the area west of 150° W, between latitudes 25° N and 40° N. Temperatures also rose slightly above February values along the North American coast northward of Pt. Conception but decreased southward of that location. Temperatures were generally lower in March than in February offshore from 130° -150° W and southward from the Alaska Peninsula to about 40° N.

These temperature changes from February to March, both warming and cooling, were greater in magnitude than is normal for this time of year. Hence, they cause alterations in the distribution of deviations from the long-term mean (Figure 5) which shows warmer-than-normal water west of longitude 160° W, from 25° -35° N, and a spreading of negative deviations offshore from 125° -145° W. Negative deviations also occur in the vicinity of 50° N, between longitudes 145° W and 155° W, indicating a change from above normal to below-normal temperatures in that area. The warm anomaly centered around 45° N, 140° W, reflects rising sea temperatures during March 1973.

Atmospheric conditions were characterized by persistent high pressure west of 140° W and south of 40° N, and by a succession of Lows moving from the Aleutians southeastward toward the U. S. west coast. Average pressures for the month exceeded the normal by more than 10 millibars in the area north of Hawaii at 35° -40° N (Figures 1 and 2). The meridional components of the resultant wind field were mostly northward in the region west of 150° W where the maximum anomalous warming of sea temperatures occurred, and southward in the region east of 150° W where anomalous cooling occurred. Average wind speeds were generally below normal in the southerly flow and above normal in the northerly flow. These factors indicate that spatial differences in heat loss by evaporation, in sensible heat exchange and in advective heat transport caused by wind stress all contributed to rearrangement of the pattern of anomalous temperatures.

Eastern Tropical Pacific

One year ago a warming trend began in the eastern tropical Pacific. Subsequently, an El Niño formed along the coast of South America and expanded westward and poleward. Since mid-February 1973 a cooling trend has begun, particularly in the surface layers of the Peru Current south of 8° S and along the equator west of the Galapagos Islands.

Except for the coastal region between 3° S and 8° S, the sea surface temperatures in the Peru Current began to cool last month, and have continued cooling at about the same rate in March (Figure 8). This cooling occurred unseasonally early since significant cooling does not usually begin along the coast north of 10° S and along the equator until mid-March. The negative temperature anomalies along the equator from 90° -115° W started to appear in February. In March the area of colder than normal temperature expanded indicating that for the first time in a year upwelling along the equator is becoming a dominate feature.

The cooling along the equator and south of 10° S along the coast of South America are apparently associated with the southeast trades which have been stronger and steadier in March 1973 than they were in March 1972 when extensive warming began to appear (Figure 9).

North of the equator, areas covered by negative anomalies in February have disappeared along the coast of Mexico and in the Gulf of Panama because surface wind speeds and cloud cover decreased markedly after the last week in February.

Between 120° W and 135° W the northeast trades were not as strong in March as in January and February 1973. Thus, sea surface temperatures have become warmer.

Subsurface Temperature Structure in the Northeast Pacific Ocean

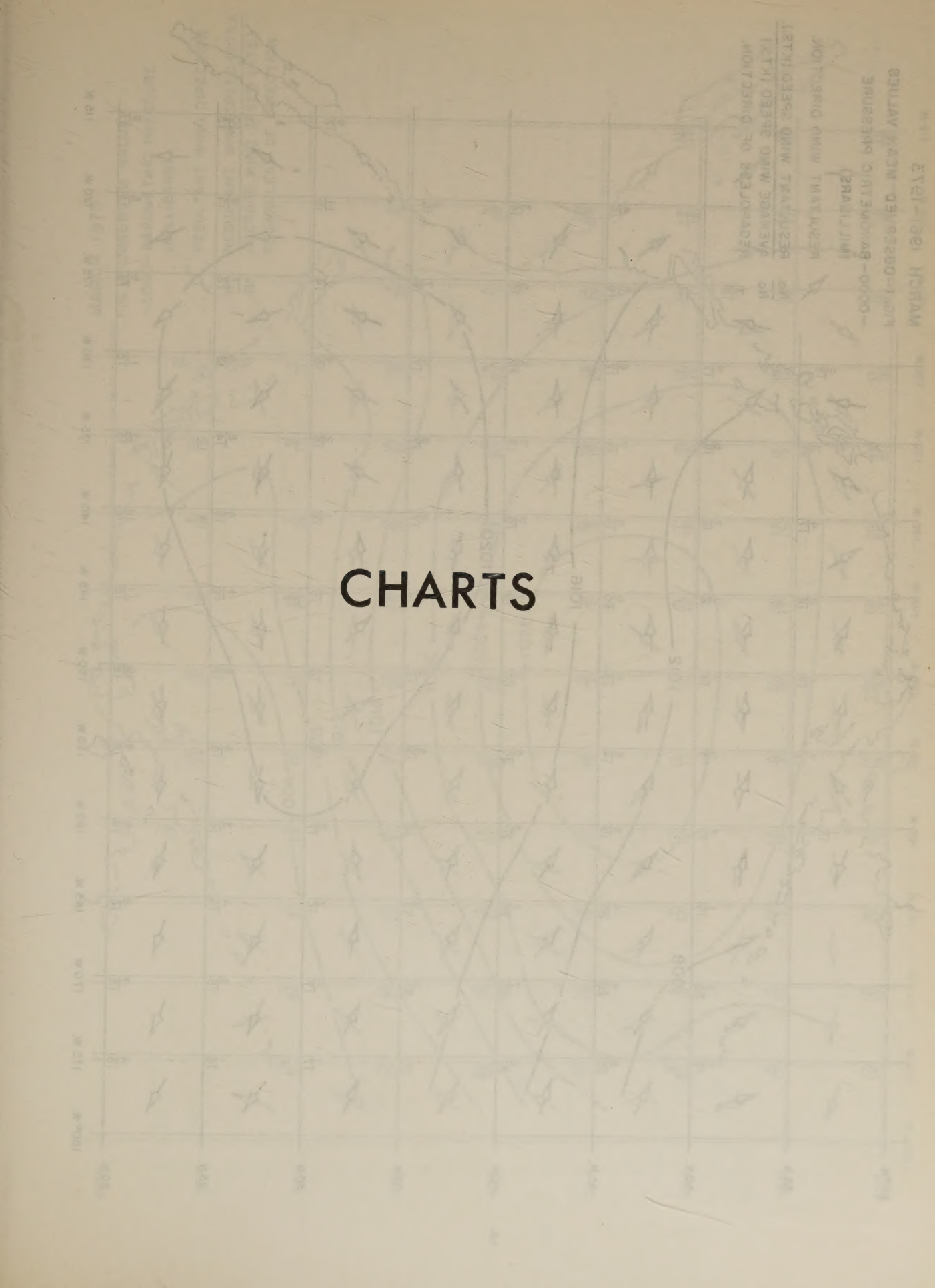
J. F. T. SAUR

The subsurface temperature observations between San Francisco and Hawaii, Figure 10, were taken from the tanker, Chevron Mississippi, during late March, about 6-1/2 weeks since the last section in early February. Seasonal cooling in the surface layer typically ends sometime in the period from February to early April and usually a strong warming trend begins to appear in the April-May period. The late March 1973 subsurface temperature structure indicates that the end of cooling cycle occurred prior to the time of the observations. Inshore of 500 nautical miles from the coast the average temperature (as a measure of heat content) of the 0-100 meter layer generally increased by 0.5°-1.0° C (0.9°-1.8° F). Beyond 600 miles the average temperature in the 0-100 meter layer showed a net decrease of 0.5° C (0.9° F). However, the appearance of a thermocline at 50 meters toward the Hawaii end of the section at stations 21-26, as opposed to 80-100 meters in early February, indicates some recent surface warming to create this shallower layer.

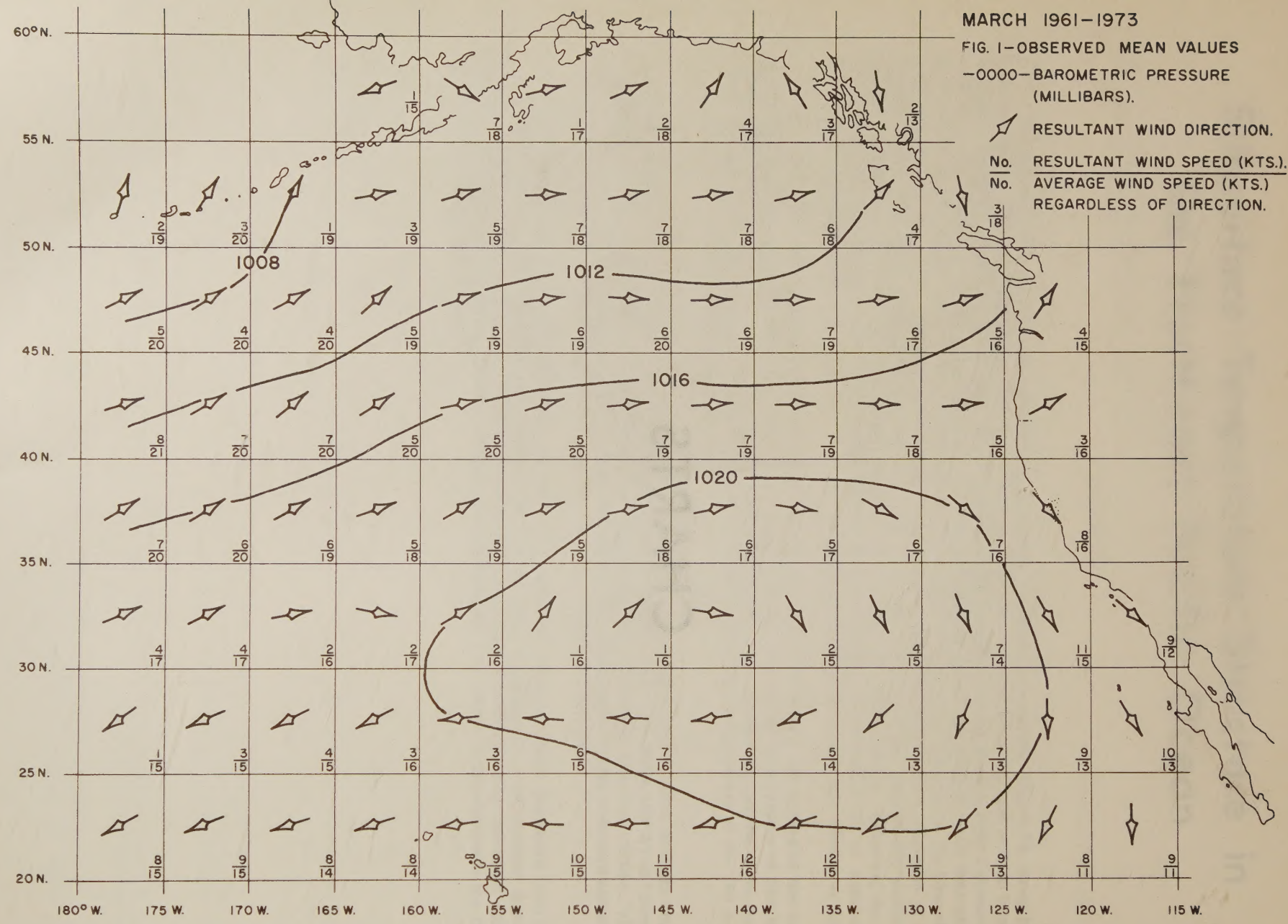
The spring of 1973 is beginning with a larger reservoir of heat in the top 100 meters of the water column than in 1972. From the California coast out to about 800 miles the average temperature of this layer is generally about 2° C(3.6° F) warmer than in 1972 when the waters in the California Current were cooler than in the past few years. Beyond 1000 miles (west of 141° W) the average temperature of the 100 meter layer is about 0.5° C (0.9° F) warmer than in 1972.

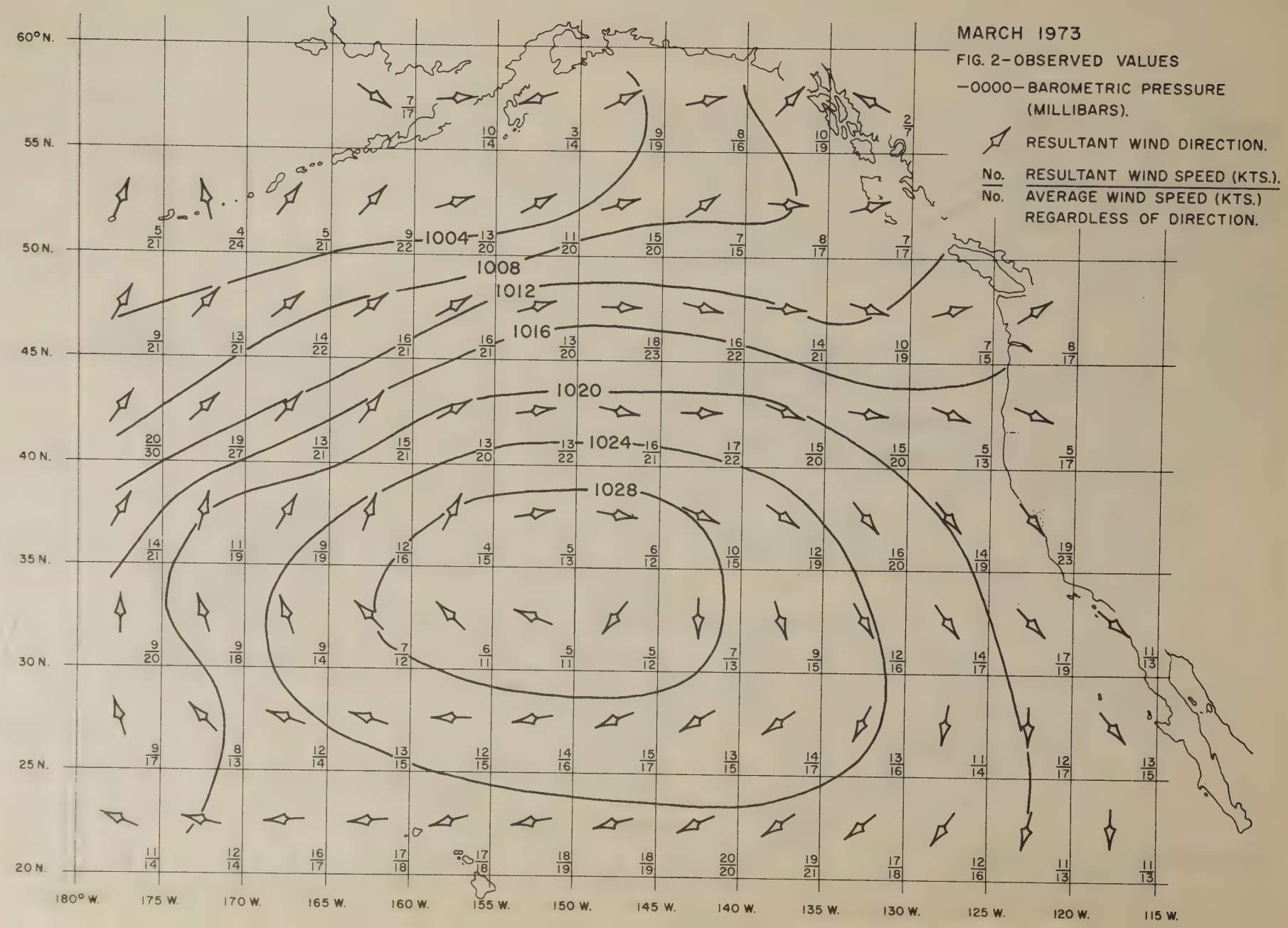
The region of the California Current extends westward from the coast about 500 miles (through station 7) and the eastern tropical Pacific Central waters are found at stations 15 and 16 (about 140° W) and beyond. The transition region from stations 8-9 through station 14 is broad, about 500 miles wide, and diffuse. These conditions contrast with those in March 1972 when the California Current waters extended westward about 800 miles to a sharp boundary and the transition region was only about 200-300 miles wide.

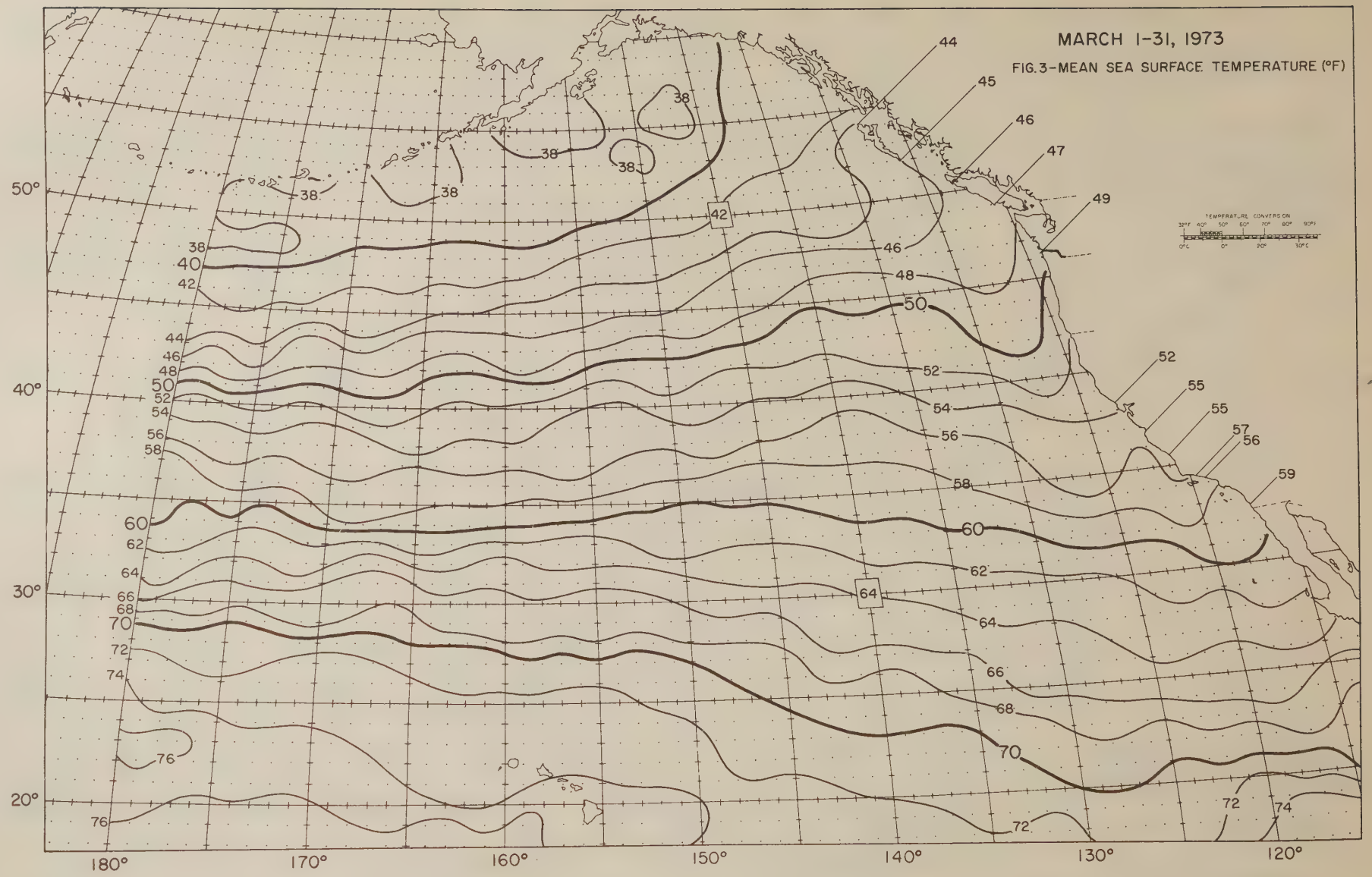
The main thermocline as represented by the 10°-15° C isotherms slope generally downward from near the California coast through the transition region. There is no sharp irregularity in thermocline depth as occurred in March 1972 when the California Current appeared to be divided into two parts by embedded eddies. Instead, the temperature structure indicates a coherent southeastward flow normal to the section in the California Current and transition region.

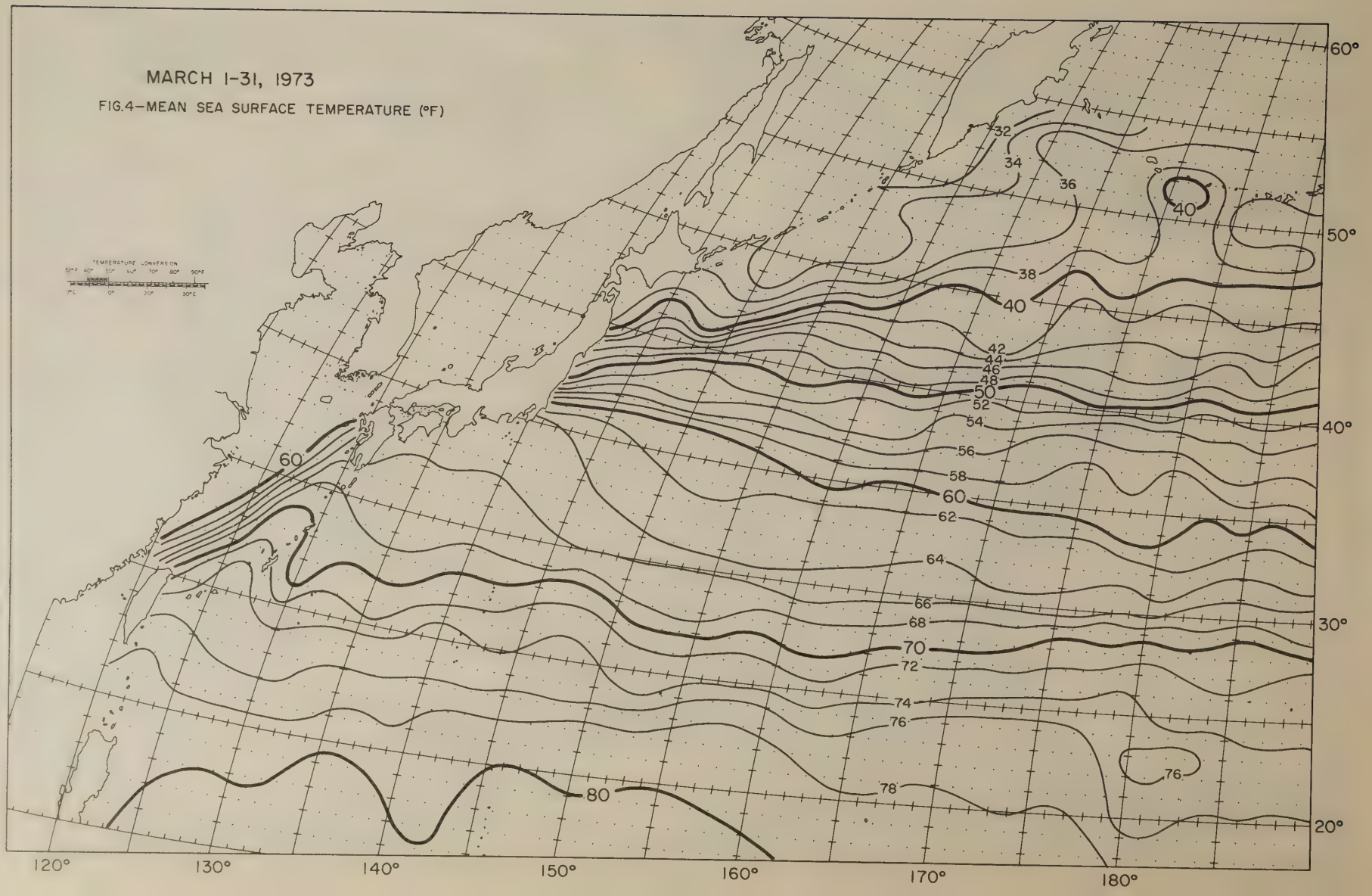


CHARTS


MARCH 1961–1973
FIG. 1–OBSERVED MEAN VALUES
–0000– BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


MARCH 1973
FIG. 2-OBSERVED VALUES
-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1004
1008
1012
1016
1020
1024
1028
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


MARCH 1-31, 1973
FIG.3-MEAN SEA SURFACE TEMPERATURE (°F)
TEMPERATURE CONVERSION
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MARCH 1-31, 1973
FIG.4—MEAN SEA SURFACE TEMPERATURE (°F)
TEMPERATURE CONVERSION
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°
32
34
36
40
38
40
42
44
46
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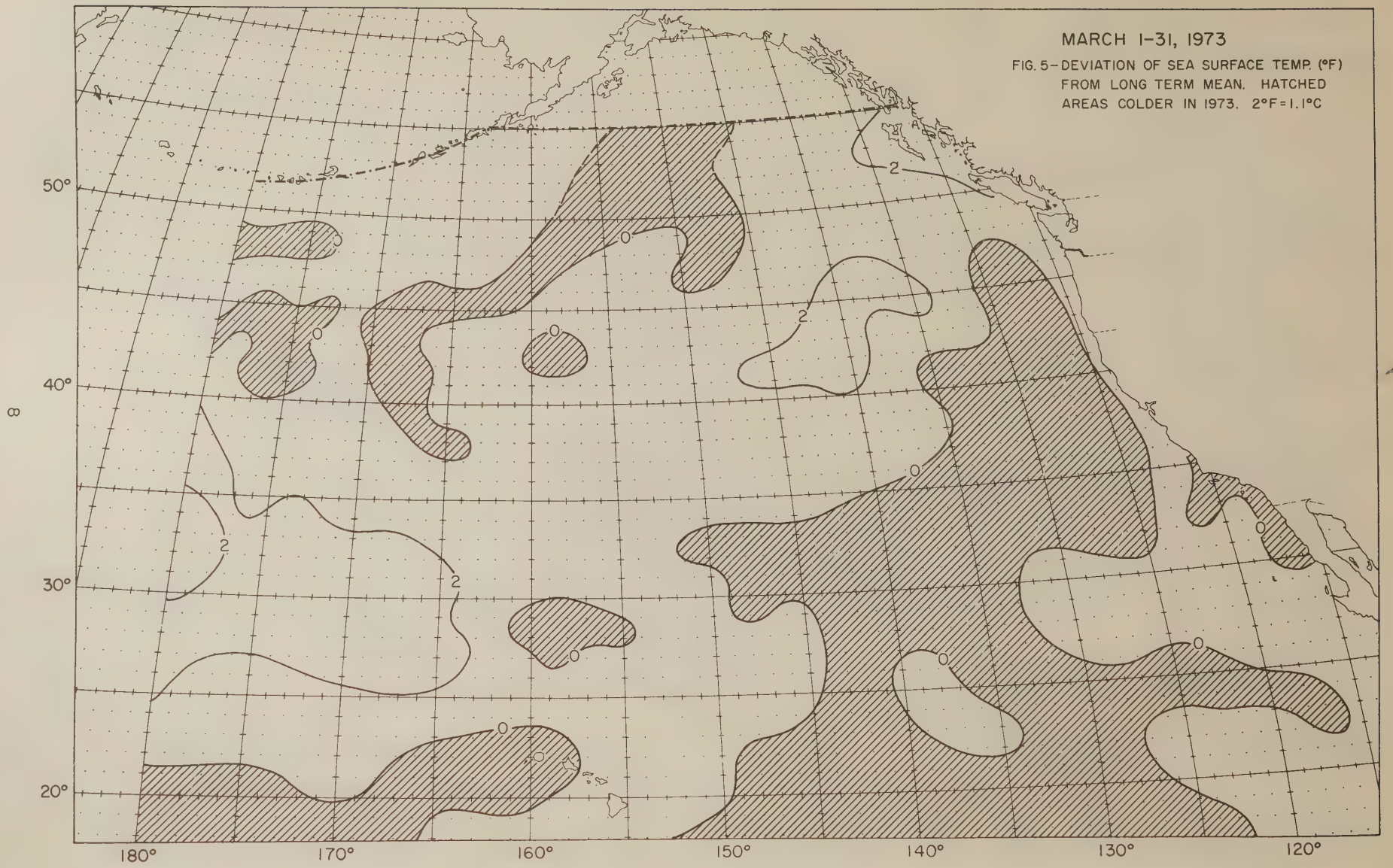
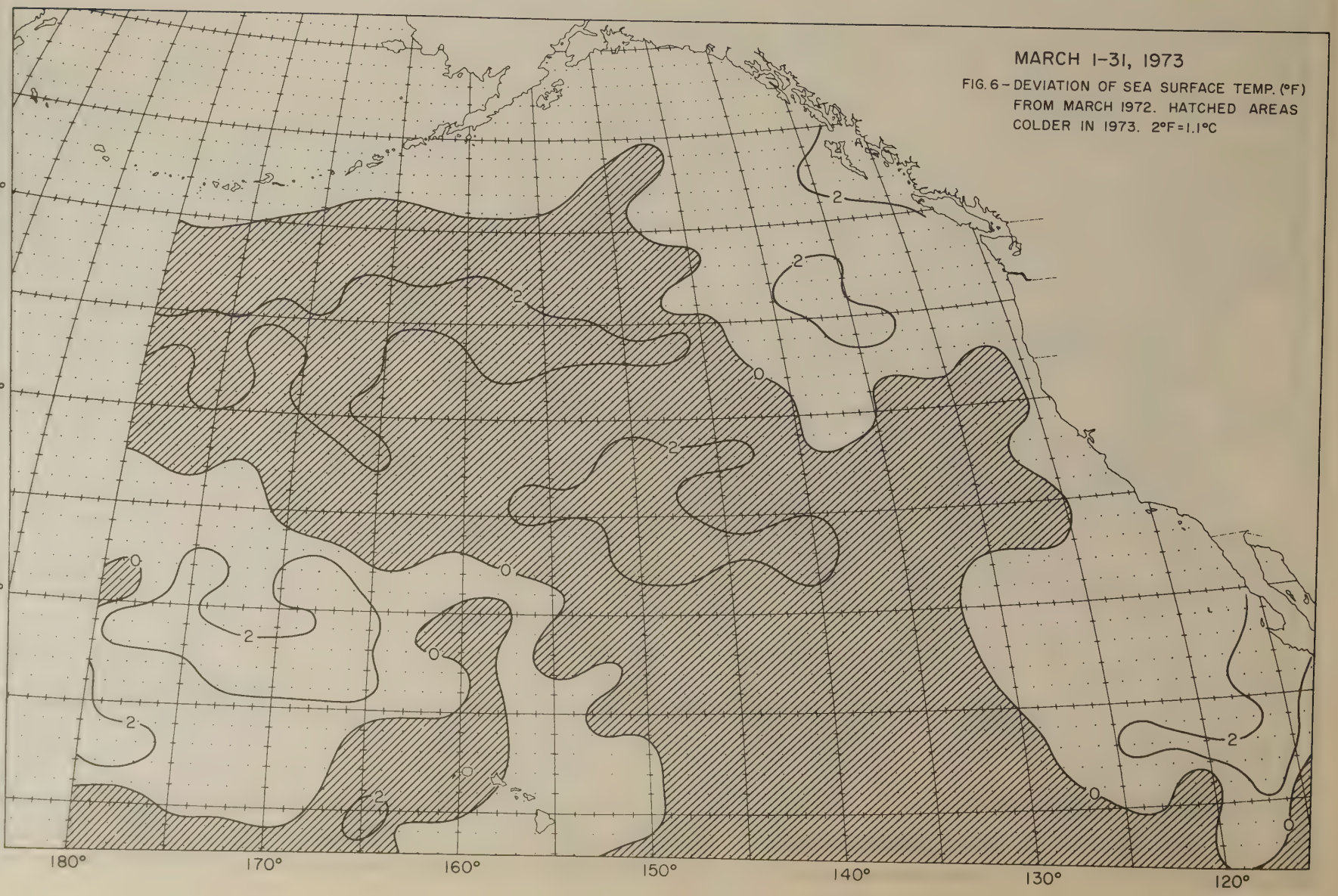
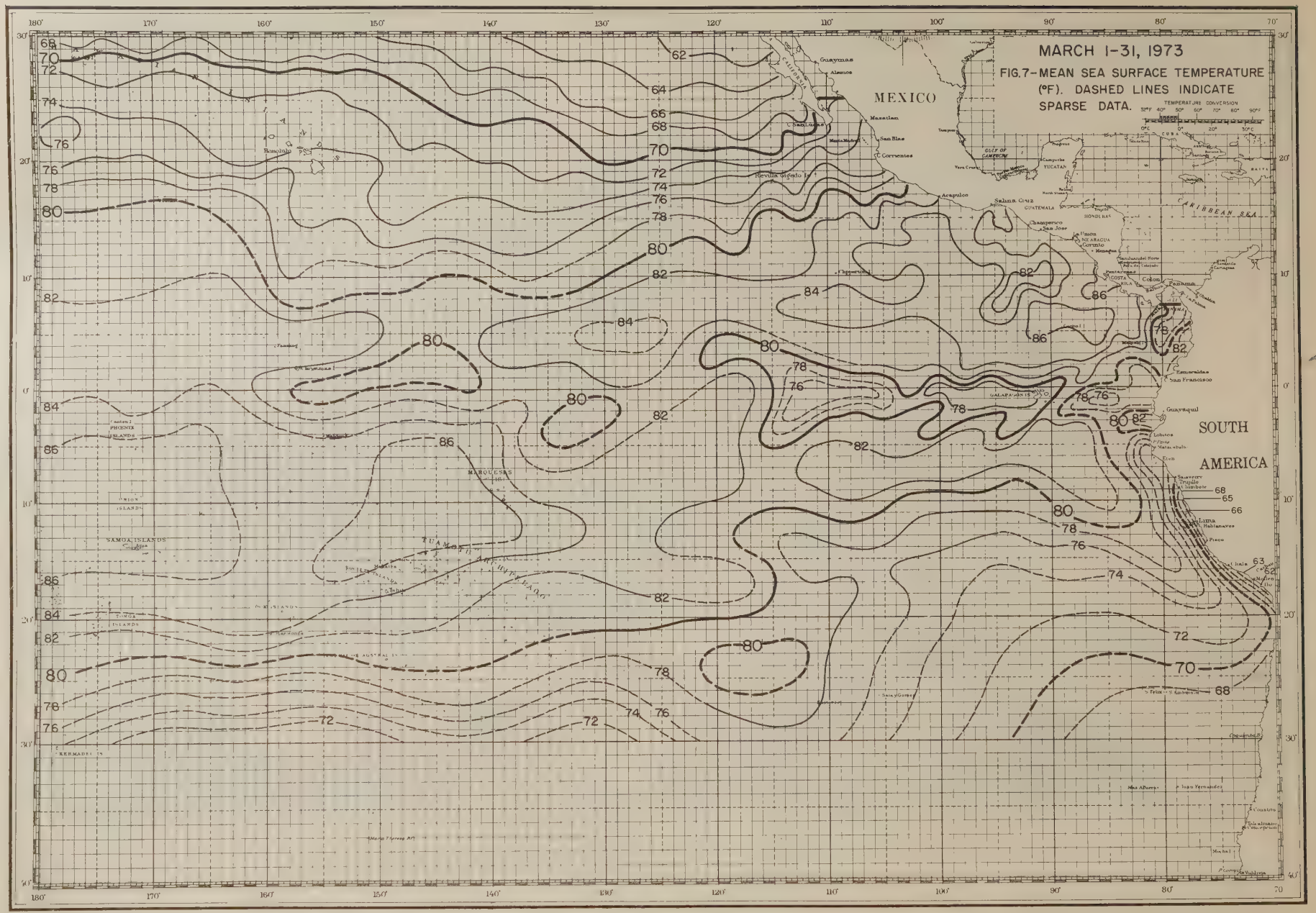
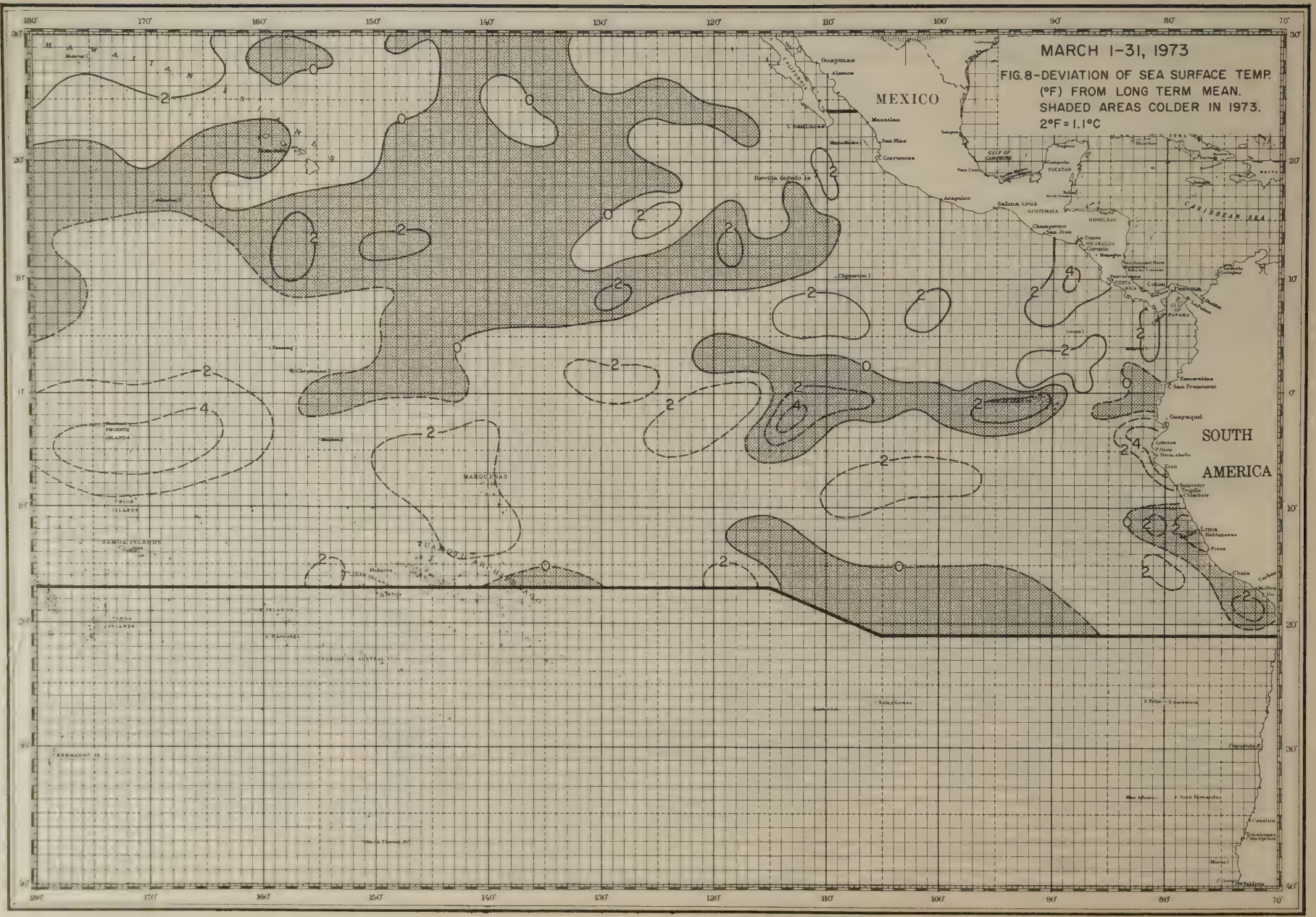
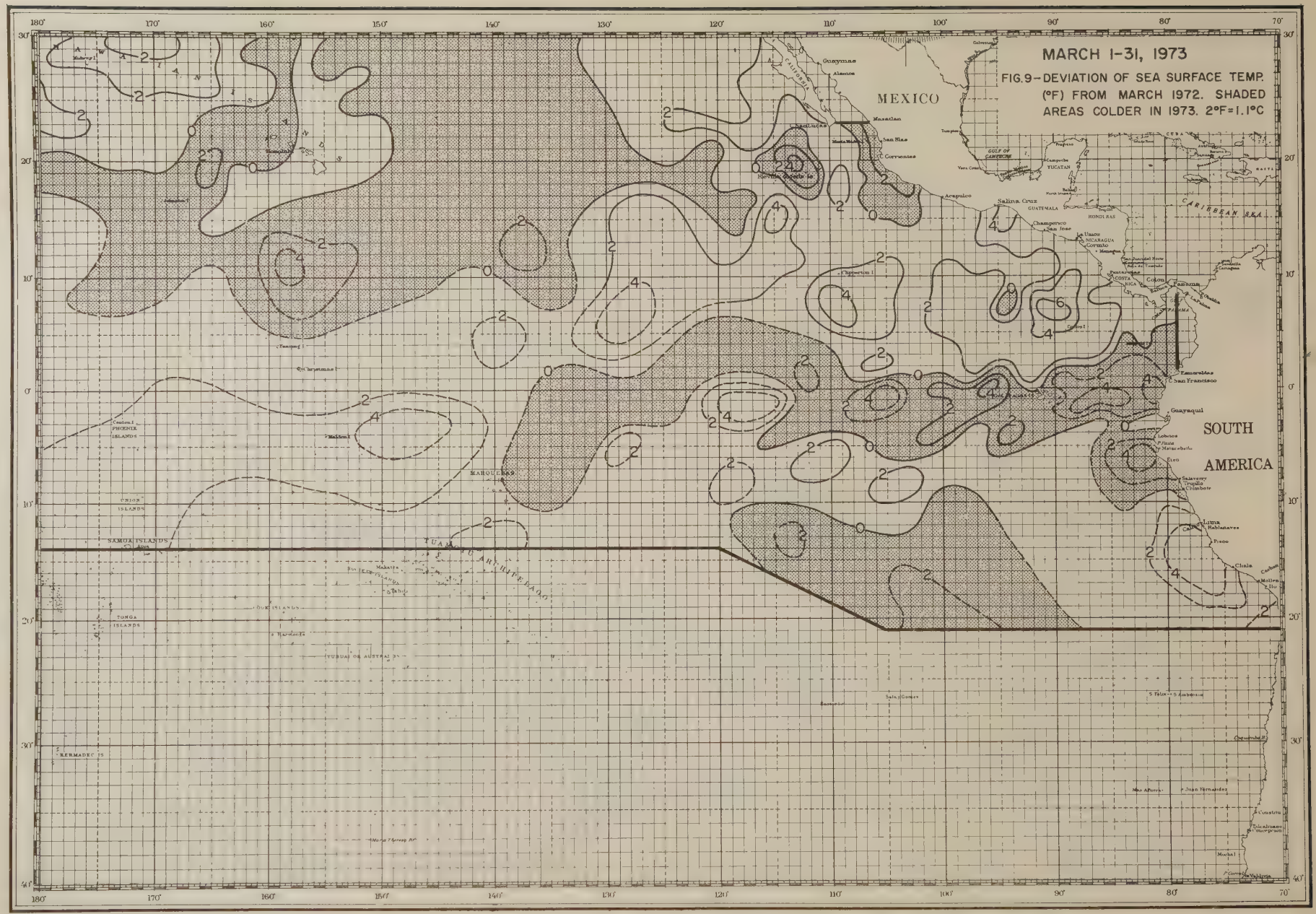
68
70
72
74
76
78
80
60
76


MARCH 1-31, 1973
FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F) FROM LONG TERM MEAN. HATCHED AREAS COLDER IN 1973. 2°F=1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2


MARCH 1-31, 1973
FIG. 6 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM MARCH 1972. HATCHED AREAS COLDER IN 1973. 2°F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
0

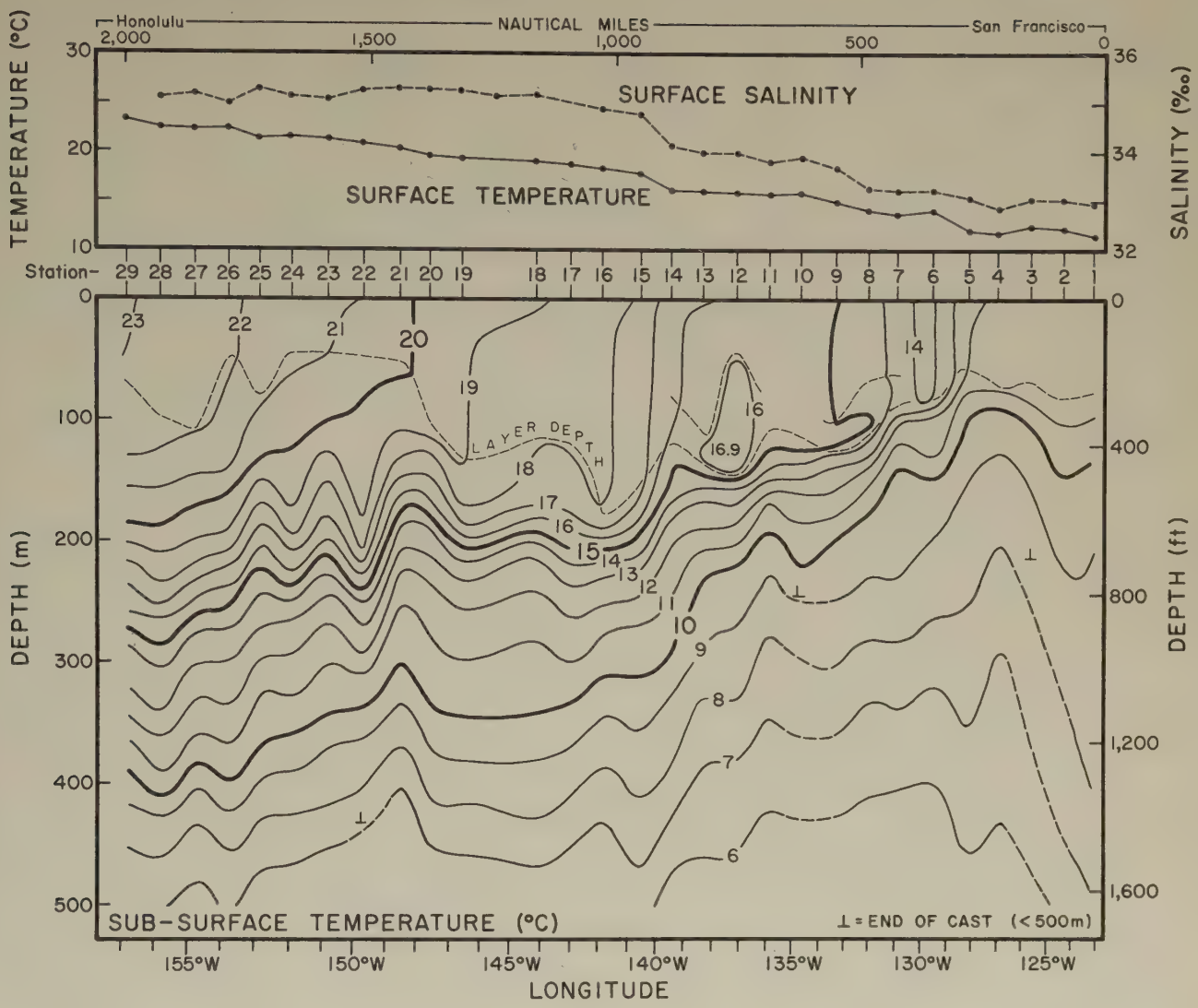

MARCH 1-31, 1973
FIG.7-MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.
TEMPERATURE CONVERSION
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GULF OF CALIFORNIA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
Guaymas
Mazatlan
San Blas
Acapulco
Salina Cruz
Chiapa
Corinto
Managua
Colon
Panama
Esmeraldas
San Francisco
Guayaquil
Lobitos
Talara
Salaverry
Trujillo
Chimbote
Lima
Callao
Pisco
Iquique
Arica
Mollendo
Matarani
Antofagasta
Coquimbo
Valparaiso
Juan Fernandez
Mas A Fuera
Easter I
PHOENIX ISLANDS
MARQUESAS
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
TONGA ISLANDS
KERMADEC IS
GALAPAGOS IS
Honolulu

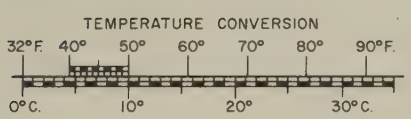

MARCH 1-31, 1973
FIG.8-DEVIATION OF SEA SURFACE TEMP. (°F) FROM LONG TERM MEAN.
SHADED AREAS COLDER IN 1973.
2°F = 1.1°C
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
HAWAIIAN IS.
PHOENIX ISLANDS
MARQUESAS
SAMOA ISLANDS
COOK ISLANDS
TUAMOTU ARCHIPELAGO
Guaymas
Alamos
Mazatlan
San Blas
Corrientes
Acapulco
Salina Cruz
Champerico
Corinto
Panama
Guayaquil
Callao
Lima
Pisco
Chala
Arica
Iquique
Antofagasta
Valparaiso
Tahiti

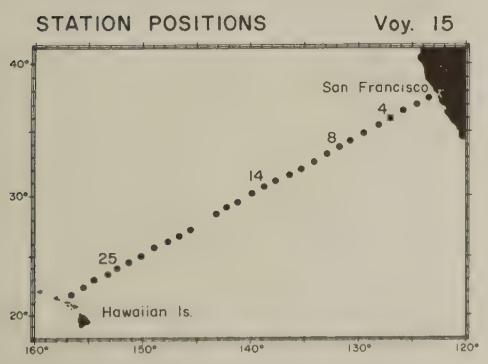

MARCH 1-31, 1973
FIG.9-DEVIATION OF SEA SURFACE TEMP. (°F) FROM MARCH 1972. SHADED AREAS COLDER IN 1973. 2°F=1.1°C
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GULF OF CALIFORNIA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
CUBA
HAITI
YUCATAN
Guaymas
Mazatlan
San Blas
Acapulco
Salina Cruz
Champerico
Corinto
Colon
Panama
Tamarindo
San Francisco
Guayaquil
Lobitos
Cleo
Salaverry
Trujillo
Chimbote
Lima
Pisco
Chala
Arica
Iquique
Mollendo
Callao
Cocos I
Malpelo I
Galapagos Is
Tagus I
Clarion I
PHOENIX ISLANDS
MARQUESAS
"UNION" ISLANDS
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
TONGA ISLANDS
OUVEA
TUBUAI OR AUSTRAL IS
KERMADEC IS
Juan Fernandez
Mocha I
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°

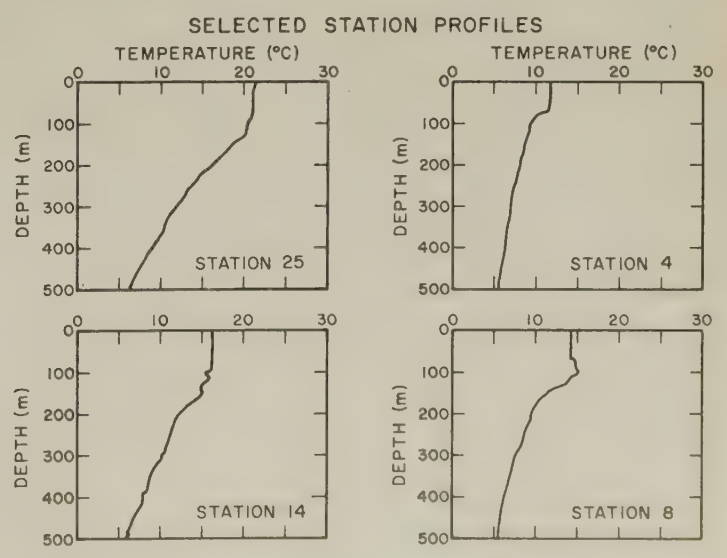
MARCH 20–25, 1973
SS CHEVRON MISSISSIPPI, Voyage 15

FIGURE 10.

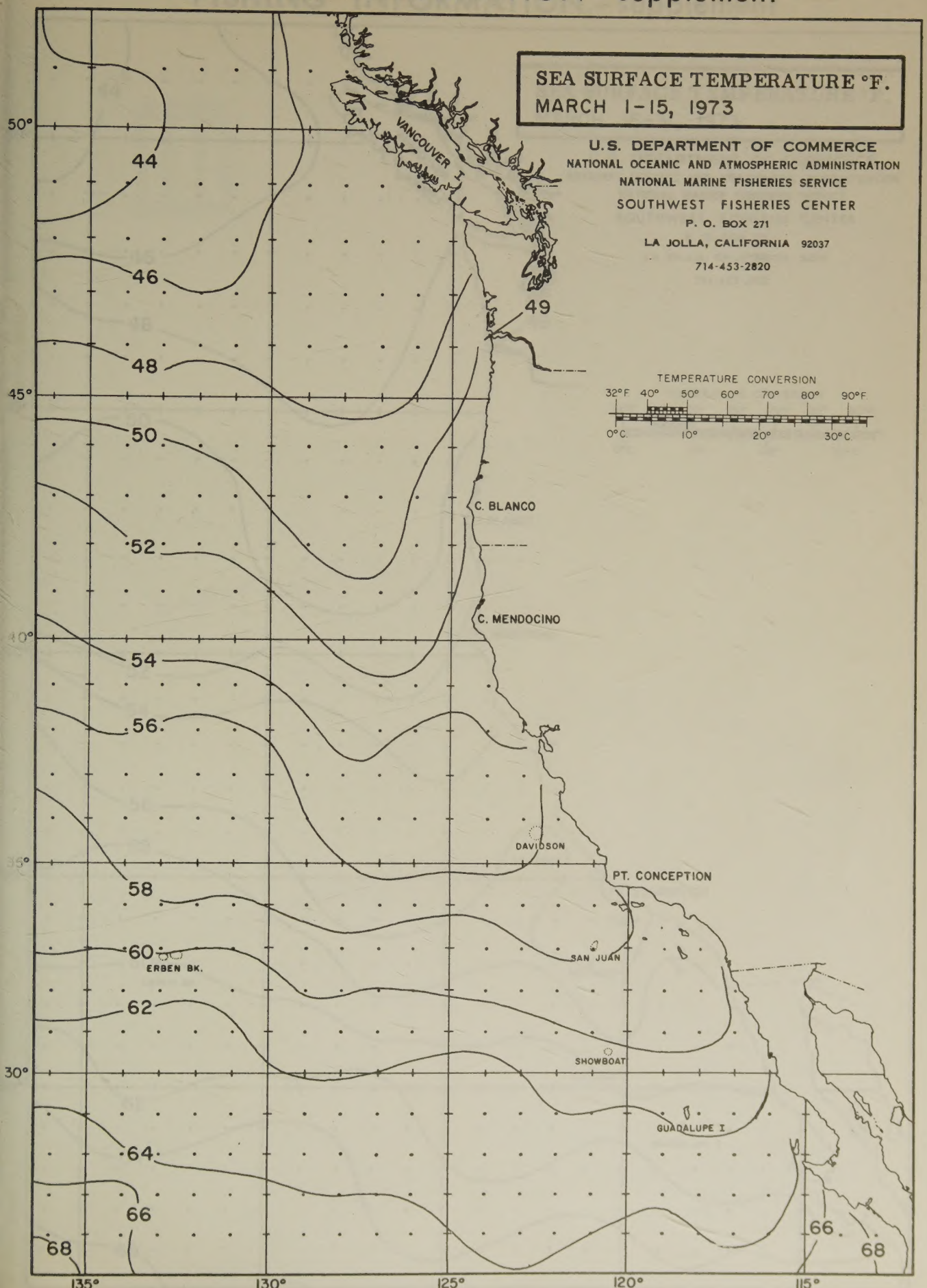








FISHING INFORMATION – supplement



FISHING INFORMATION – supplement